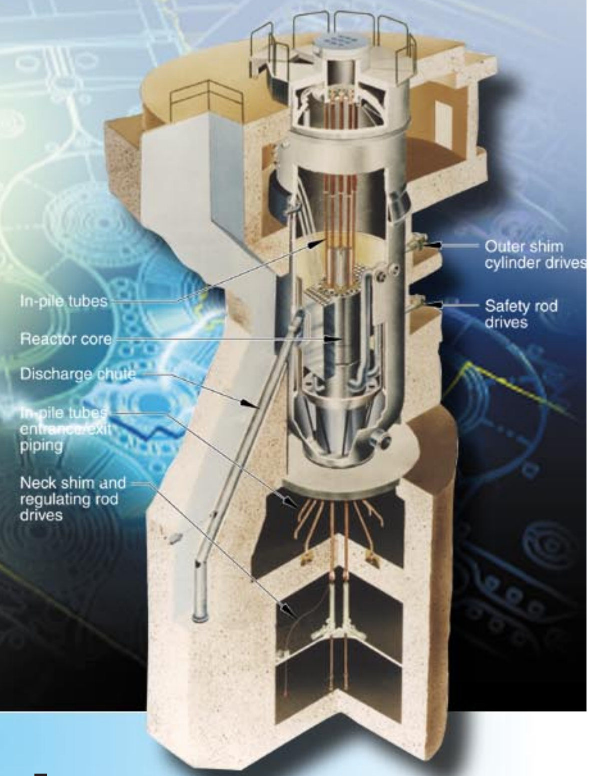
The INL's Advanced Test Reactor is the most powerful test reactor operating in the United States.



Nuclear Programs

Advanced Test Reactor

Irradiation facilities and capabilities for the future

The Advanced Test Reactor is located at the Department of Energy's Idaho National Laboratory. The ATR is the most powerful test reactor operating in the United States. The ATR has contributed to over 50 new reactor designs and use is planned far into the 21st century.

Some of the unique features include:

- Reactor Type - Pressurized, light-water moderated and cooled; with a beryllium reflector
- Reactor Vessel – Solid stainless steel, 3.65 m (12 ft) diameter cylinder, 10.67 m (35 ft) high
- Reactor Core - 1.22 m (4 ft) diameter and 1.22 m (4 ft) height with 40 fuel elements arranged in a serpentine configuration, creating five main power lobes (four corner and one center) around nine flux trap positions.
- Total Core Power – 250MW maximum with typical operation at 110 to 120 MW
- Coolant Temperatures & Pressures – Inlet conditions are 52°C (125°F) at 2450 kPa (355 psi) with outlet conditions at 71°C (160°F) and 1585 kPa (230 psi) for 250 MW operation. Typical operation at 110-120 MW will employ the same inlet conditions, but yield outlet conditions of 60°C (140°F) at 1860 kPa (270 psi).
- Approximate Peak Flux Values (Unperturbed) at 250 MW = 1 x 10^{15} n/cm^2–sec thermal, 5 x 10^{14} n/cm^2-sec fast; During 110 MW operation, the peak

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Idaho National Laboratory

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unperturbed flux values are 4.4×10^{14} n/cm^2–sec thermal, 2.3×10^{14} n/cm^2-sec fast

- Hafnium Reactivity Control Drums/Rods - maintains axial flux shape during operating cycle and enables flux/power adjustments between core lobes/flux traps.
- Irradiation Facilities – Total of 77 irradiation positions consisting of 9 flux trap positions (5 with in-pile tubes connected to pressurized water loops and 4 with irradiation housings) and 68 reflector positions. The irradiation positions span entire core height (1.2 m or 4 ft) and range in diameter from 1.59 cm (0.625 in) to 12.7 cm (5.000 in).
- Operating Cycles – nominally 7 cycles per year with a typical length of 7 weeks, but occasionally there are short 2 week high-power cycles. Reactor outages are typically 7 or 14 days in length, which allows ample time for experiment insertions and manipulations.

The Advanced Test Reactor can irradiate structural materials and fuel samples or produce radioisotopes in any of the irradiation positions. Testing can be accomplished in three different methods to fit an experimenter's needs. These three methods are:

Simple Capsule Testing

- Passive instrumentation (flux wires, melt wires)
- Reflector positions or flux traps
- Lengths up to 1.2 m, diameters up to 12.7 cm
- Flux tailoring capability
- Approximately six months lead time for new tests
- Usually the least expensive testing technique

Instrumented Lead Experiments

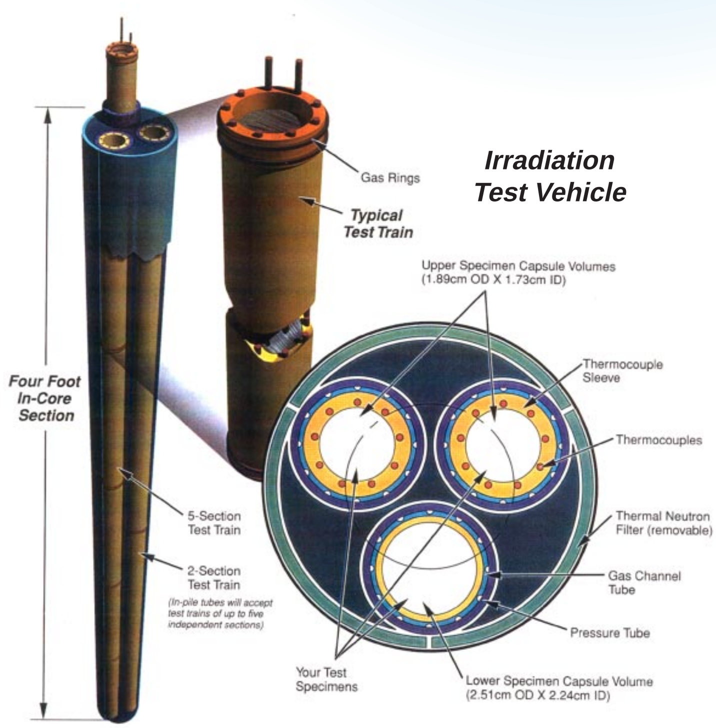
- On-line instrument (temperature) measurements with or without active temperature control
- Reflector positions or flux traps
- Lengths up to 1.2 m, diameters up to 12.7 cm
- Flux tailoring capability
- Approximately one year lead time for new tests
- More expensive testing technique due to increased instrumentation and/or temperature control and associated operating costs

Pressurized Water Loops

- Five flux trap positions currently have pressurized water in-pile loop testing capability (1 large diameter, 4 small diameter) - past operations have had as many as nine loop tests. Each loop has its own temperature, pressure, flow & chemistry control systems
- Lengths up to 1.2 m, diameters up to 12.7 cm
- Typically limited to flux trap positions, but has been accomplished in reflector positions under non-flowing conditions
- Flux tailoring and transient testing capabilities
- Most expensive testing technique due to significantly increased instrumentation and control with associated operating costs
- Up to two year lead time for new test programs

The Advanced Test Reactor can irradiate structural materials and fuel samples or produce radioisotopes in any of the irradiation positions. Testing can be accomplished in three different methods:

- ***Simple Capsule Testing***
- ***Instrumented Lead Experiments***
- ***Pressurized Water Loops***



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